INDUSTRIAL COMBUSTION COORDINATED RULEMAKING
POLLUTION PREVENTION SUBGROUP REPORT
February 18, 1998

I. Subgroup Recommendations

The Subgroup offers two recommendations to the Coordinating Committee for consideration. First, the Subgroup requests that the Committee extend the Charter for the Pollution Prevention Subgroup until the next Coordinating Committee meeting (April 28-29, 1998). Second, attached are recommendations for how the Source Work Groups might incorporate "good combustion practices" into regulatory recommendations.

II. Subgroup Charter

The Charter of the Pollution Prevention Subgroup is to:

1. Research and assess pollution prevention methods and techniques which could be applicable to sources included within the ICCR; and

2. To develop recommendations for the Coordinating Committee on how Source Work Groups could identify, develop, and incorporate - where reasonable and/or appropriate - pollution prevention into their regulatory recommendations.

The Subgroup was directed to report recommendations at the February Committee meeting.

III. Pollution Prevention and Subgroup Approach

The Subgroup felt a common definition of "pollution prevention" was critical to fulfilling the Subgroup's Charter. Rather than devote resources to developing a definition of pollution prevention, the Subgroup agreed to accept and communicate to the Coordinating Committee the definition of pollution prevention adopted by EPA. This definition is detailed in Attachments I and II. As shown by these attachments, pollution prevention is placed at the pinnacle of a pollution control hierarchy and is EPA's "preferred" approach in developing policies and rules. In a nutshell, pollution prevention is considered "source reduction" as defined in the Pollution Prevention Act. In terms of energy use, pollution prevention should be considered in terms of techniques which increase efficiency in energy use, substitute environmentally benign fuel sources, and/or design changes that reduce the demand for energy.

Although this definition of pollution prevention is narrow in scope, the Subgroup felt that there were many other non-pollution prevention techniques, which "prevent pollution", and which should be researched. To serve as an initial point of reference for identifying pollution prevention techniques, as well as techniques which prevent pollution, the Subgroup concluded that sources (e.g., boilers, incinerators, turbines, etc.) should be considered as "systems" which include inputs, the combustion device itself (e.g., boiler, heaters, turbine, etc.), and outputs. This "visualization" of sources as systems is illustrated by Figure 1 attached.

Based on this visualization of sources as systems, the Subgroup formed three work teams:

Input Work Team (Fuel/Waste Management) chaired by John Shoaff and including Dave Schanbacher, Jane Williams, and Janet Peargin.

Combustion Device Work Team (Device Operation) subdivided into two sub-work teams:

Good Combustion Practices chaired by John DeRuyter and including Miriam Lev-On, Sam Clowney, Bill O'Sullivan, Fred Porter, and Jane Williams.

Operator Training chaired by John Fanning and including John DeRuyter, Fred Porter, and Tom Tyler. While not a "member" of the Pollution Prevention Subgroup, Steve Gerritson is also included as a participant.

Output Work Team (Energy Management) chaired by Alex Johnson and including Beth Berglund, Kimberly Davis, and John Shoaff. While not a "member" of the Pollution Prevention Subgroup, Chuck Solt is included as a participant.

IV. Extension of Subgroup Charter

After nearly four months of research, conference calls, meetings and discussions, the Pollution Prevention Subgroup recommends that the Coordinating Committee extend the Subgroup's Charter until the April meeting of the Committee. Although recommendations have been developed by the Subgroup regarding some techniques which prevent pollution (see Good Combustion Practices below), the Subgroup has not developed recommendations regarding pollution prevention techniques, nor recommendations regarding other techniques which prevent pollution (e.g., operator training). If the Charter of the Subgroup is extended, the goal of the Subgroup would be to develop and present recommendations to the Committee at the April meeting regarding pollution prevention techniques, as well as recommendations regarding other techniques which prevent pollution (e.g., operator training).

V. Good Combustion Practices

The Subgroup recommends the Coordinating Committee consider, and forward to the Source Work Groups as Committee recommendations, the attached "Good Combustion Practices". These recommendations, which focus on procedures, knowledge, routine and periodic adjustments and checks, and other actions, identify possible ways the Source Work Groups could incorporate requirements for the use of good combustion practices into regulatory recommendations - with the caveat that not all of these recommendations are applicable in all cases, or to all sources. The Subgroup also recommends that, in forwarding these recommendations, the Committee urge their evaluation by the Source Work Groups on a "case-by-case" and "source-by-source" basis, before drawing conclusions on whether they are appropriate to include in regulatory recommendations.

VI. Output Work Team

While not a recommendation, the Subgroup felt it would be helpful to forward to the Committee a refinement of the visualization of sources as systems, developed by the Output Work Team. This refinement, a concept of energy load analyses, is attached as Figure 2. The Output Work Team feels this figure is useful for identifying energy efficiency and conservation pollution prevention techniques, as well as for identifying incentives and deterrents to utilizing these pollution prevention techniques at ICCR sources.

VI. Subgroup Membership

Active Members:

Fred Porter	John Shoaff	John DeRuyter
Alex Johnson	John Fanning	Bill O'Sullivan
Kimberly Davis	Miriam Lev-On	Beth Berglund
Tom Tyler	Robert Morris	Janet Peargin
Sam Clowney	Jane Williams	David Schanbacher

Non-Member Participants:

Chuck Solt	Steve Gerritson

Inactive Members:

Lachhman Dev	Ed Repa	Coleman Kavanagh

GOOD COMBUSTION PRACTICES

This guidance is intended to be used by the source work groups in their evaluation of alternative concepts regarding good combustion practices. While operator training could also be considered a good combustion practice, it is covered by separate guidance.

Examples of practices listed are intended to indicate the range of existing practices which are dependent on the specific type of equipment utilized and the fuel/waste input to the combustion device. All examples of specific techniques are not considered applicable to all combustion sources. The source work groups should be requested to evaluate techniques, practices, and possible standard approaches appropriate for subcategories or other subsets of sources.

Periodic checks and adjustments of combustion equipment are intended to occur at intervals appropriate for the source, with key combustion checks timed no less frequent than to coincide with overhaul frequencies.

Good Combustion Technique	Examples of Practices	Applicable Source Types	Possible Standard
Operator practices	-Official documented operating procedures, updated as required for equipment or practice change -Procedures include startup, shutdown, malfunction -Operating logs/record keeping	All	-Maintain written site specific operating procedures in accordance with GCPs, including startup, shutdown, malfunction
Maintenance knowledge	-Training on applicable equipment & procedures	All	-Equipment maintained by personnel with training specific to equipment
Maintenance practices	-Official documented maintenance procedures, updated as required for equipment or practice change -Routinely scheduled evaluation, inspection, overhaul as appropriate for equipment involved -Maintenance logs/record keeping	All	-Maintain site specific procedures for best/optimum maintenance practices -Scheduled periodic evaluation, inspection, overhaul as appropriate

Good Combustion Technique	Examples of Practices	Applicable Source Types	Possible Standard
Stoichiometric (fuel/air) ratio	-Burner & control adjustment based on visual checks -Burner & control adjustment based on continuous or periodic monitoring (O2, CO, CO2) -Fuel/air metering, ratio control -Oxygen trim control -CO control -Safety interlocks	Open combustion	-SR limits appropriate for unit design & fuel -Routine & periodic adjustment -CO limit
Firebox (furnace) residence time, temperature, turbulence	-Supplemental stream injection into active flame zone -Residence time by design (incinerators) -Minimum combustion chamber temperature (incinerators)	-Open combustion with supplemental vent streams -Incinerators	
Proper liquid atomization	-Differential pressure between atomizing media & liquid -Flow ratio of atomizing media to liquid flow -Liquid temp or viscosity -Flame appearance -Atomizer condition -Atomizing media quality	Open combustion with liquid fuel/waste	-Routine & periodic adjustments & checks -Maintain procedures to ensure adequate atomization & mixing with combustion air
Fuel/waste quality (analysis); fuel/waste handling	-Monitor fuel/waste quality -Fuel quality certification from supplier if needed -Periodic fuel/waste sampling and analysis -Fuel/waste handling practices	All- where appropriate	-Fuel/waste analysis where composition could vary & of significance to HAP emissions (e.g., not pipeline natural gas) -Fuel/waste handling procedures applicable to the fuel/waste
Fuel/waste sizing	-Fuel/waste sizing specification & checks -Pulverized coal fineness checks	Solid fuel/waste firing	-Specification appropriate for fuel/waste fired -Periodic checks
Combustion air distribution	-Adjustment of air distribution system based on visual observations -Adjustment of air distribution based on continuous or periodic monitoring	Mainly stoker and solid fuel firing	-Routine & periodic adjustments & checks
Fuel/waste dispersion	-Adjustment based on visual observations	Solid fuel/waste firing	-Routine & periodic adjustments & checks

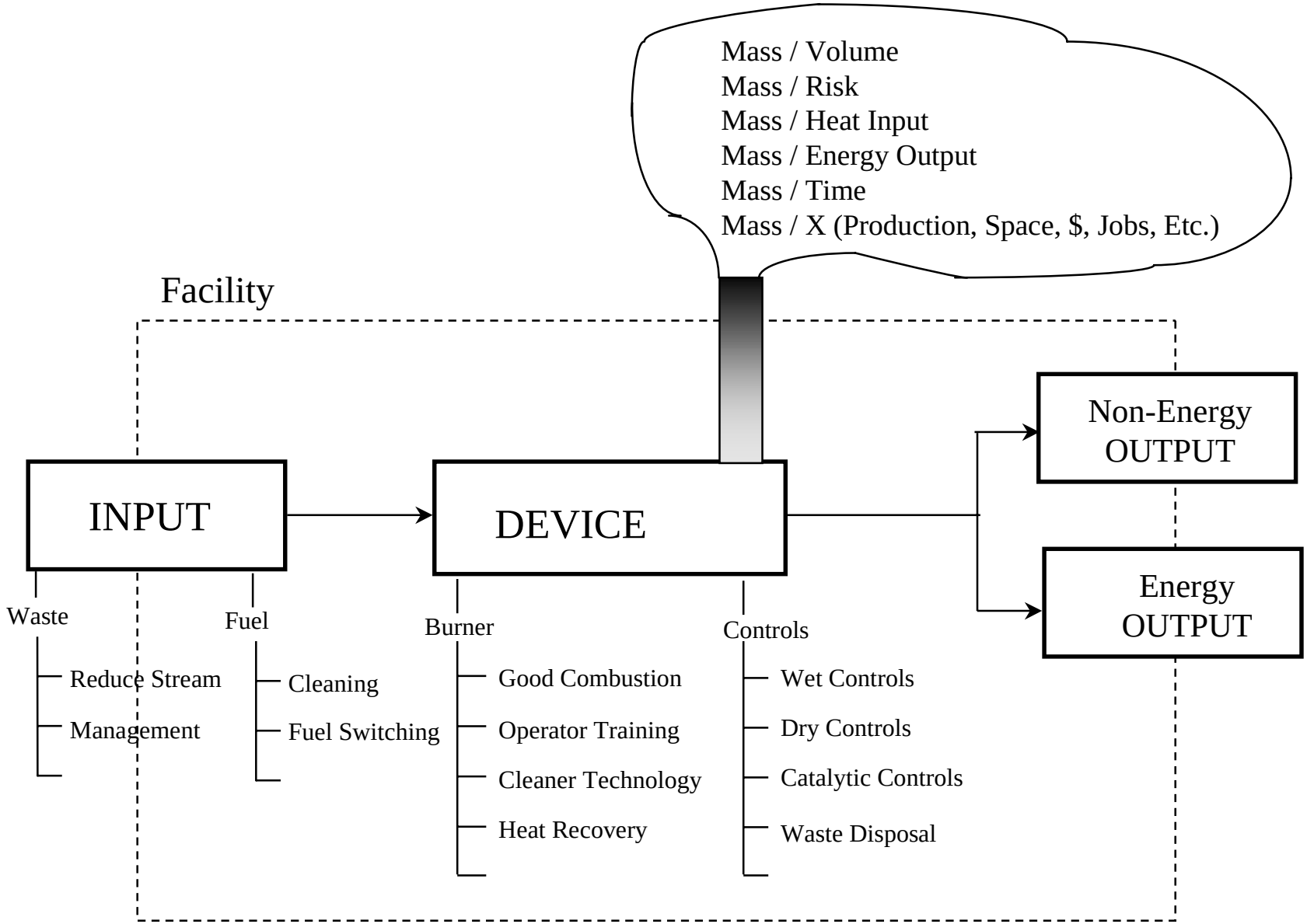
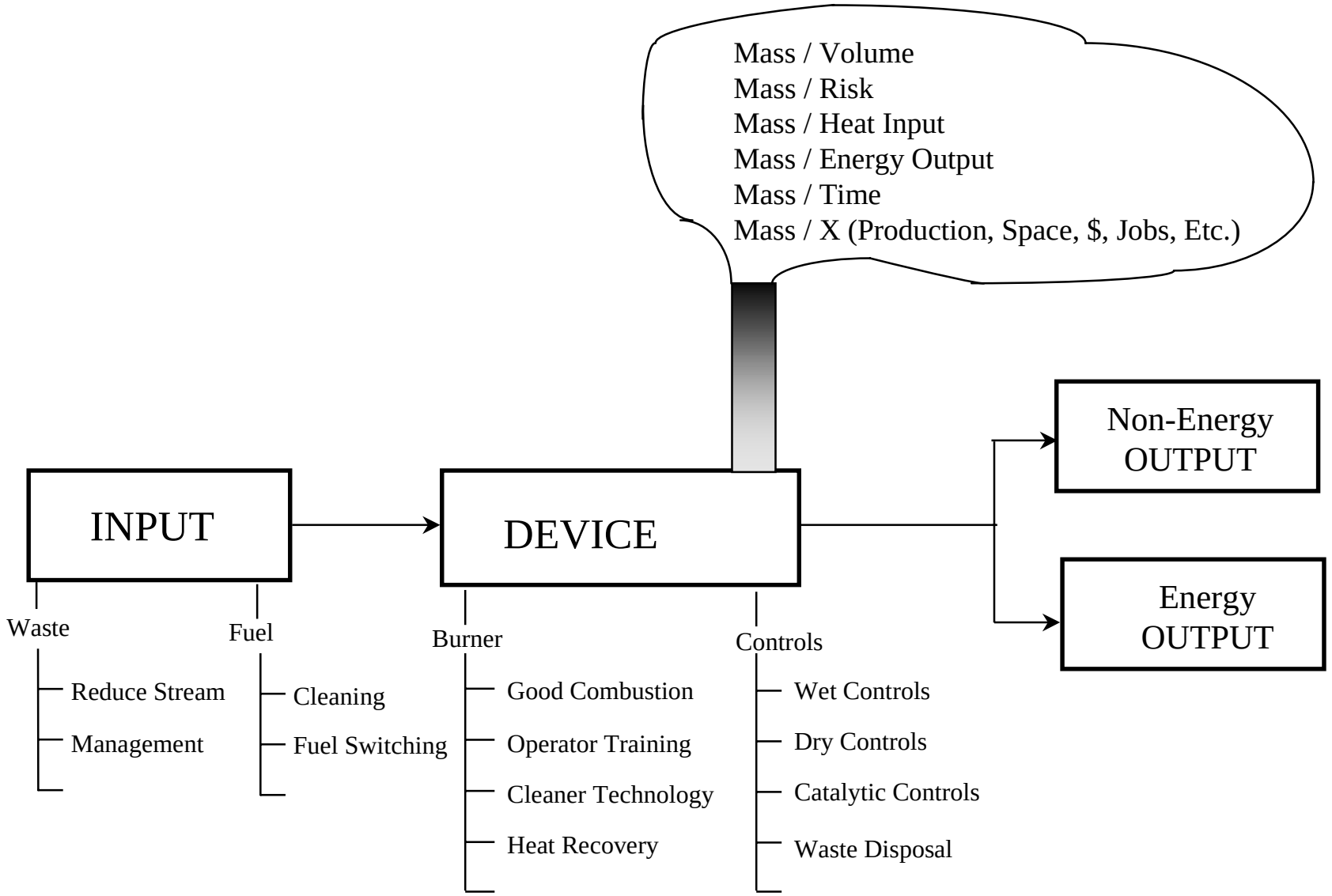

Mass / Volume
Mass / Risk
Mass / Heat Input
Mass / Energy Output
Mass / Time
Mass / X (Production, Space, $, Jobs, Etc.)
Facility
INPUT
DEVICE
Non-Energy OUTPUT
Energy OUTPUT
Waste
Reduce Stream
Management
Fuel
Cleaning
Fuel Switching
Burner
Good Combustion
Operator Training
Cleaner Technology
Heat Recovery
Controls
Wet Controls
Dry Controls
Catalytic Controls
Waste Disposal

FIGURE 1


Mass / Volume
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Energy OUTPUT
Waste
Reduce Stream
Management
Fuel
Cleaning
Fuel Switching
Burner
Good Combustion
Operator Training
Cleaner Technology
Heat Recovery
Controls
Wet Controls
Dry Controls
Catalytic Controls
Waste Disposal

FIGURE 2

Attachment I

Pollution Prevention as Defined Under the Pollution Prevention Act of 1990

Following passage of the Pollution Prevention Act of 1990, the U.S. Environmental Protection Agency (EPA) developed a formal definition of pollution prevention and a strategy for making pollution prevention a central guiding mission. Under Section 6602(b) of the Pollution Prevention Act, Congress established a national policy that:

> pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner. (Source: Henry F. Habicht II, Memorandum: EPA Definition of Pollution Prevention. U.S. Environ mental Protection Agency, May 28, 1992.)

This hierarchy of preferred options for dealing with environmental pollution officially places prevention at the top of the list.

According to the EPA's official definition, pollution prevention means "source reduction" as defined in the Pollution Prevention Act, but also includes "other practices that reduce or eliminate the creation of pollutants through (1) increased efficiency in the use of raw materials, energy, water, or other resources, or (2) protection of natural resources by conservation." Source reduction is defined under the Act as any practice which:

> reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants. Source reduction includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control."

Thus, pollution prevention can be thought of as roughly synonymous with source reduction --- reducing the generation of wastes or contaminants at the source, and thereby reducing releases to the environment that could pose hazards to the environment and public health. Like source reduction, pollution prevention as defined by the Pollution Prevention Act does not include out-of-process recycling, waste treatment, or combustion of wastes for energy recovery.

The exclusion of recycling from the official definition of pollution prevention activities has been a source of controversy. Strictly speaking, recycling is not a form of prevention. However, recycling can confer substantial environmental improvements and can aid in conserving valuable resources. Thus, industry has argued that recycling should be on par with pollution prevention,

since it represents progress toward reducing environmental pollution and achieving greater efficiency in resource use. The EPA has held fast to the more strict interpretation of pollution prevention which excludes recycling because even wastes that are effectively recycled have not been prevented (else they would not exist to be recycled!). However, the position of recycling as the second highest option in Congress's and the EPA's pollution prevention/waste management hierarchy attests to its desirability as a goal in cases where wastes cannot be feasibly prevented. Furthermore, in some cases in-process recycling --- in which materials are directly reincorporated back into the same process --- is considered a form of pollution prevention.

Related Concepts and Terminology:

Because P2 is a newly developing field, there is a lot of terminology being used by different groups and individuals, not all of which is yet well defined or consistently used. Some of the terms, such as source reduction, are essentially synonymous with pollution prevention, as discussed above. However, there are many other terms which, although related to pollution prevention, have specific meanings or usages. The following is a brief explanation of some of the more common terms. A note of caution: the definitions provided here may not coincide in all cases with the meaning intended by some authors or sources.

Pollution prevention itself is a term that can have a variety of meanings, depending upon who is using it. Although the EPA's definition is perhaps the most widely known, others have defined pollution prevention to include recycling and reclamation activities (activities which Congress and the EPA specifically exclude). For example, a draft standard being prepared by the American Society for Testing and Materials (ASTM) on the development and implementation of pollution prevention programs defines pollution prevention as "the act of reducing or eliminating the use, release or generation of a pollutant or potential pollutant through source reduction, recycling, reuse, reclamation or modification of existing practices." (Source: ASTM E50.03 Subcommittee on Pollution Prevention, Reuse, Recycling and Environmental Efficiency, Standard E50.03.1: Guide for Development and Implementation of a Pollution Prevention Program. Working Document, January 24, 1994. Standard is available from ASTM Customer Service Department by calling 215/299-5585.)

Waste minimization was one of the first initiatives in the area of pollution prevention, and focused almost exclusively on solid wastes regulated under the Resource Conservation and Recovery Act (RCRA) --- particularly hazardous wastes. (Source: U. S. EPA, Pollution Prevention 1991: Progress on Reducing Industrial Pollutants. Washington, DC: Office of Pollution Prevention, U.S. EPA, October, 1991. (EPA 21p-3003) pp. 6-7.) Thus waste minimization is much narrower than the current definition of pollution prevention, which focuses on reducing the entire spectrum of pollution and waste, including air emissions, releases to surface and groundwaters, and inefficient energy and materials use, in addition to waste (in the traditional sense) which is sent off for land disposal, treatment, or off-site recycling. Waste minimization has been controversial since it has often included treatment methods to reduce the volume or toxicity of existing waste, rather than focusing solely on minimizing the amount of waste being generated at the source. Recent RCRA reporting requirements now exclude treatment and energy recovery from the definition of waste minimization activities. However, unlike the EPA's definition of pollution prevention, waste

minimization does includes recycling in addition to source reduction activities. (Source: Henry Freeman et al., "Industrial Pollution Prevention: A Critical Review." Journal of Air and Waste Management42, no. 5 (May 1992) 619-620.)

Waste reduction is a term that falls somewhere between waste minimization and pollution prevention. Waste reduction has a broader focus than waste minimization with its emphasis on RCRA hazardous wastes, but implies a narrower perspective than pollution prevention with its holistic approach to preventing all types of pollution released to all environmental media from products as well as from industrial processes. Use of the term waste reduction is not widespread, perhaps in part due to its ambiguity.

Toxics use reduction is the elimination or avoidance of using toxic substances in products or processes so as to reduce the risks to the health of workers, consumers, and the general public, and to minimize adverse effects on ecosystems and the environment. Toxics use reduction falls under source reduction. Toxic chemical use substitution refers to the substitution of toxic chemicals with less harmful substances in products or processes. It can also include efforts to reduce or eliminate the use of specific chemicals or categories of toxic substances through development of appropriate substitutes or alternative technologies. Source reduction and toxic chemical use substitution together comprise industrial pollution prevention. (U.S. EPA, Pollution Prevention 1991: Progress on Reducing Industrial Pollutants. EPA 21p-3003. Washington: Office of Pollution Prevention, U.S. EPA, October, 1991. pp. 6-7.)

Attachment II

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

Office of the Administrator
May 28, 1992

MEMORANDUM

SUBJECT: EPA Definition of "Pollution Prevention"

FROM: F. Henry Habicht II /signed/
Deputy Administrator

TO: All EPA Personnel

EPA is seeking to integrate pollution prevention as an ethic throughout its activities, in accordance with the national policy expressed in the Pollution Prevention Act of 1990. Your individual efforts to push development of new opportunities, approaches, and processes to prevent pollution are impressive and exciting.

While the concept of pollution prevention is broadly applicable--a tool to accomplish many environmental tasks--this memo attempts to guide more consistent use of the term in our activities and written materials. Pollution prevention requires a cultural change--one which encourages more anticipation and internalizing of real environmental costs by those who may generate pollution, and which requires EPA to build a new relationship with all of our constituents to find the most-effective means to achieve those goals.

The following EPA "Statement of Definition" is a formal embodiment of what has been the Agency's working definition of pollution prevention, and is consistent with the Pollution Prevention Act of 1990 and the Agency's 1991 Pollution Prevention Strategy. It makes clear that prevention is our first priority within an environmental management hierarchy that includes: 1)prevention, 2) recycling, 3) treatment, and 4) disposal or release.

While it is subject to further refinement, this definition should provide a common reference point for all of us. As you review and apply the definition in your work, please keep the following points in mind:

- As always, whether the pollution prevention option is selected in any given situation will depend on the requirements of applicable law, the level of risk reduction that can be achieved, and the cost-effectiveness of that option.

- Accordingly, the hierarchy should be viewed as establishing a set of preferences, rather than an absolute judgement that prevention is always the most desirable option. The

hierarchy is applied to many different kinds of circumstances that will require judgement calls.

- Drawing an absolute line between prevention and recycling can be difficult. "Prevention" includes what is commonly called "in-process recycling," but not "out-of-process recycling." Recycling conducted in an environmentally sound manner shares many of the advantages of prevention, e.g. energy and resource conservation, and reducing the need for end-of-pipe treatment or waster containment.

As EPA looks at the "big picture" in setting strategic directions for the decade ahead, it is clear that prevention is key to solving the problems that all our media programs face, including the increasing cost of treatment and cleanup. In the common-sense words of Benjamin Franklin, "an ounce of prevention is worth a pound of cure."

Please use the Statement of Definition of Pollution Prevention in all of your EPA activities.

POLLUTION PREVENTION: EPA STATEMENT OF DEFINITION
(pursuant to the Pollution Prevention Act of 1990 and the Pollution Prevention Strategy)

Under Section 6602(b) of the Pollution Prevention Act of 1990, Congress established a national policy that:

-- pollution should be prevented or reduced at the source whenever feasible;
-- pollution that cannot be prevented should be recycled in an environmentally safe manner whenever feasible;
-- pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and
-- disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner.

Pollution prevention means "source reduction," as defined under the Pollution Prevention Act, and other practices that reduce or eliminate the creation of pollutants through:

-- increased efficiency in the use of raw materials, energy, water, or other resources, or
-- protection of natural resources by conservation.

The Pollution Prevention Act defines "source reduction" to mean any practice which:

-- reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and
-- reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.

The term includes: equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.

Under the Pollution Prevention Act, recycling, energy recovery, treatment, and disposal are not included within the definition of pollution prevention. Some practices commonly described as "in-process recycling" may qualify as pollution prevention. Recycling that is conducted in an environmentally sound manner shares many of the advantages of prevention--it can reduce the need for treatment or disposal, and conserve energy and resources.

In the agricultural sector, pollution prevention approaches include:

-- reducing the use of water and chemical inputs;
-- adoption of less environmentally harmful pesticides or cultivation of crop strains with natural resistance to pests; and
-- protection of sensitive areas.

In the energy sector, pollution prevention can reduce environmental damages from extraction, processing, transport, and combustion of fuels. Pollution prevention approaches include:

-- increasing efficiency in energy use;
-- substituting environmentally benign fuel sources; and
-- design changes that reduce the demand for energy.

For more information contact:
-- the Pollution Prevention Policy Staff (202-260-8621), or
-- the Pollution Prevention Division, Office of Pollution Prevention and Toxics (202-260-3557